

## Universal Douglas Driver Application Note: Hi-Pot Instructions for Drivers with MOVs Connected to Ground

### Overview

Hi-Pot (High Potential) tests are required for luminaires after final assembly. This test provides a high potential voltage between the fixture ground and the input leads of luminaire. The standard test may cause damage to LED drivers that contain MOV's (Metal Oxide Varistors) that are connected between the power leads and ground for transient suppression and protection. This will also result in a Hi-Pot test failure. Regulatory agencies have an alternate test for luminaires that have LED drivers that are configured this way. This test is described below

### Testing Voltage Determination and Procedure

The following test procedure is recommended for luminaires using Universal LED drivers that incorporate MOV surge protection. Consult your NRTL agency for approval before adopting this test procedure.

Reference: **CSA-C22.2 No. 250.13, Appendix B, Clause B.1.9**

The luminaire is to be subjected for 1 s, without breakdown, to one of following voltages:  
1.5 times the working voltage; or  
if voltage-limiting devices or line-to-ground filters operate below 1.5 times the working voltage, the value of the applied voltage should be 0.9 times the clamping voltage, but not less than that of the working voltage.

Example:  $V_{\text{working}} = 120 \text{ V}$ ,

(a1)  $V_{\text{clamp}} = 200 \text{ V}$ ,  $V_{\text{test}} = 180 \text{ V}$  ( $1.5 \times 120 \text{ V} = 180 \text{ V}$ )

(b1)  $V_{\text{clamp}} = 150 \text{ V}$ ,  $V_{\text{test}} = 135 \text{ V}$  ( $0.9 \times 150 \text{ V} = 135 \text{ V}$ )

(b2)  $V_{\text{clamp}} = 130 \text{ V}$ ,  $V_{\text{test}} = 120 \text{ V}$  ( $0.9 \times 130 \text{ V} = 117 \text{ V}$ ,  $< V_{\text{working}} = 120 \text{ V}$ )

Note: This test may be conducted using a dc potential at 1.414 times the ac potential.

### Universal Douglas LED Driver w/ MOV's (L-N to Ground) Hi-Pot Voltage Analysis:

**Universal Voltage (120-277V) Example:** Working Voltage: 277V /  $V_{\text{clamp}}=320\text{V}$

$V_{\text{test}} = 0.9 \times 320 = \underline{288\text{V}}$  (1.5 x 277V = 415V which exceeds the clamping voltage)

**High Range Voltage (347-480V) Example:** Working Voltage: 480V /  $V_{\text{clamp}}=550\text{V}$   
(1.5 x 480V = 720V which exceeds  $V_{\text{clamp}}=550\text{V}$   $V_{\text{test}} = 0.9 \times 550 = 495\text{V}$  the clamping voltage)

## Drivers with 6kV Transient Protection

The following Universal LED drivers with 6kV transient protection incorporate MOVs. Test voltages and duration are shown below for customer use with the Hi-Pot testing procedure found in **CSA-C22.2 No. 250.13, Appendix B, Clause B.1.9.**

Driver Model	MOV Clamp Voltage	Hipot Test Location		Test Voltage (AC)	Test Voltage (DC)	Duration
		From:	To:			
D15CC55UVPA12-FS	320 Vac	Supply Leads	Ground	288 Vac	407 Vdc	1 second
D15CC55UVPA24-FS	320 Vac	Supply Leads	Ground	288 Vac	407 Vdc	1 second
L12V60UV6-A	320 Vac	Supply Leads	Ground	288 Vac	407 Vdc	1 second
D21CC80UV6PWX12-D	320 Vac	Supply Leads	Ground	288 Vac	407 Vdc	1 second
D23CC90UNVT-F	320 Vac	Supply Leads	Ground	288 Vac	407 Vdc	1 second
D23CC90UNVTW-F	320 Vac	Supply Leads	Ground	288 Vac	407 Vdc	1 second
D23CC90HRVT-F	550 Vac	Supply Leads	Ground	495 Vac	700 Vdc	1 second
D23CC90HRVTW-F	550 Vac	Supply Leads	Ground	495 Vac	700 Vdc	1 second
D28CC95UVPA12-F	320 Vac	Supply Leads	Ground	288 Vac	407 Vdc	1 second
D28CC95UVPA24-F	320 Vac	Supply Leads	Ground	288 Vac	407 Vdc	1 second
D28CC95UVPA12-VF	320 Vac	Supply Leads	Ground	288 Vac	407 Vdc	1 second
D28CC95UVPA24-VF	320 Vac	Supply Leads	Ground	288 Vac	407 Vdc	1 second
L24V100UV6-A	320 Vac	Supply Leads	Ground	288 Vac	407 Vdc	1 second
D530C150UVT-F	320 Vac	Supply Leads	Ground	288 Vac	407 Vdc	1 second
D530C150HVT-F	550 Vac	Supply Leads	Ground	495 Vac	700 Vdc	1 second
D700C150UVT-F	320 Vac	Supply Leads	Ground	288 Vac	407 Vdc	1 second
D700C150HVT-F	550 Vac	Supply Leads	Ground	495 Vac	700 Vdc	1 second
D10CC150UVT-F	320 Vac	Supply Leads	Ground	288 Vac	407 Vdc	1 second
D10CC150HVT-F	550 Vac	Supply Leads	Ground	495 Vac	700 Vdc	1 second
D14CC150UVT-F	320 Vac	Supply Leads	Ground	288 Vac	407 Vdc	1 second
D14CC150HVT-F	550 Vac	Supply Leads	Ground	495 Vac	700 Vdc	1 second
D530C150UV10F	320 Vac	Supply Leads	Ground	288 Vac	407 Vdc	1 second
D530C150HV10F	550 Vac	Supply Leads	Ground	495 Vac	700 Vdc	1 second
D700C150UV10F	320 Vac	Supply Leads	Ground	288 Vac	407 Vdc	1 second
D700C150HV10F	550 Vac	Supply Leads	Ground	495 Vac	700 Vdc	1 second
D10CC150UV10F	320 Vac	Supply Leads	Ground	288 Vac	407 Vdc	1 second
D10CC150HV10F	550 Vac	Supply Leads	Ground	495 Vac	700 Vdc	1 second
D14CC150UV10F	320 Vac	Supply Leads	Ground	288 Vac	407 Vdc	1 second
D950C180UNVPWX12-F	320 Vac	Supply Leads	Ground	288 Vac	407 Vdc	1 second
D14CC180UNVPWX12-F	320 Vac	Supply Leads	Ground	288 Vac	407 Vdc	1 second
D20CC180UNVPWX12-F	320 Vac	Supply Leads	Ground	288 Vac	407 Vdc	1 second
D950C180HRVPWX12-F	550 Vac	Supply Leads	Ground	495 Vac	700 Vdc	1 second
D14CC180HRVPWX12-F	550 Vac	Supply Leads	Ground	495 Vac	700 Vdc	1 second
D20CC180HRVPWX12-F	550 Vac	Supply Leads	Ground	495 Vac	700 Vdc	1 second

### 347V Drivers with Non-Powered Tuning

The following Universal 347V LED drivers with Non-Powered Tuning incorporate MOVs. These drivers are marked with the NPT logo.



Test voltages and duration are shown below for customer use with the Hi-Pot testing procedure found in **CSA-C22.2 No. 250.13, Appendix B, Clause B.1.9.**

Driver Model	MOV Clamp Voltage	Hipot Test Location		Test Voltage (AC)	Test Voltage (DC)	Duration
		From:	To:			
D700C30347TZ-C	420 Vac	Supply Leads	Ground	378 Vac	535 Vdc	1 second
D10CC30347TZ-C	420 Vac	Supply Leads	Ground	378 Vac	535 Vdc	1 second
D10CC55347TZ-C	420 Vac	Supply Leads	Ground	378 Vac	535 Vdc	1 second
D15CC55347TZ-C	420 Vac	Supply Leads	Ground	378 Vac	535 Vdc	1 second
D21CC80347TZ-D	420 Vac	Supply Leads	Ground	378 Vac	535 Vdc	1 second
D700C30347TW-C	420 Vac	Supply Leads	Ground	378 Vac	535 Vdc	1 second
D10CC30347TW-C	420 Vac	Supply Leads	Ground	378 Vac	535 Vdc	1 second
D10CC55347TW-C	420 Vac	Supply Leads	Ground	378 Vac	535 Vdc	1 second
D15CC55347TW-C	420 Vac	Supply Leads	Ground	378 Vac	535 Vdc	1 second
D21CC80347TW-D	420 Vac	Supply Leads	Ground	378 Vac	535 Vdc	1 second
D700C30347TW-K/KS	420 Vac	Supply Leads	Ground	378 Vac	535 Vdc	1 second
D10CC30347TW-K/KS	420 Vac	Supply Leads	Ground	378 Vac	535 Vdc	1 second
D10CC55347TW-K/KS	420 Vac	Supply Leads	Ground	378 Vac	535 Vdc	1 second
D15CC55347TW-K/KS	420 Vac	Supply Leads	Ground	378 Vac	535 Vdc	1 second